

**FACT SHEET FOR NPDES  
PERMIT NO. WA-002193-9**

**City of Cle Elum  
Upper Kittitas County Regional Wastewater Treatment Facility**

**SUMMARY**

The City of Cle Elum completed major construction of a new Sequential Batch Reactor (SBR) wastewater treatment plant in the spring of 2005 in part of the existing facultative lagoon #1. An SBR is a biological treatment system in which all the major steps, flow equalization, aeration and clarification occurs in the same tank in sequential order. The facility will provide wastewater treatment for the City of Cle Elum, Town of South Cle Elum, City of Roslyn, Ronald and unincorporated areas in the vicinity of Ronald and the Suncadia Resort.

The 30 year “build-out” design criteria allows for a average daily flow of 3.6MGD. Over the course of the time leading to “build-out” capacity, as new service customers are added to the facility, the mixing zone and subsequent dilution factors will be adjusted to reflect the projected flow for a given permit cycle. The present acute dilution factor is 7.3:1 with a chronic dilution factor of 36.8:1. The current allowed mixing zone is 300 feet downstream and 100 feet upstream with a width of 70 feet for the chronic mixing zone and 30 feet downstream and 10 feet upstream with a width of 7 feet for the acute mixing zone.

The permit contains technology based limits for BOD, TSS, Ammonia and Chlorine, which would be used in a rare emergency caused by Ultra Violet disinfection failure. Because chlorine disinfection is highly unlikely, the technology based limit for chlorine has been adopted in the proposed permit. Temperature is not limited during the proposed permit cycle in order to collect temperature data for the 2011 permit cycle. Temperature effects were modeled using a higher than expected summer effluent temperature (27.1) against critical season river flow and temperatures. The model predicted no reasonable potential for a violation of the present water quality standard and at a more rigorous 16°C proposed new standard.

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## **INTRODUCTION**

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has authorized the State of Washington to administer the NPDES permit program. Chapter 90.48 RCW defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	City of Cle Elum
Facility Name and Address	Upper Kittitas County Regional Wastewater Treatment Facility 500 Owens Road Cle Elum, WA 98922
Type of Treatment:	Sequential Batch Reactor, SBR
Approximate Discharge Location	Yakima River Latitude: 47° 11' 10" N Longitude: 120° 55' 12" W.
Water Body ID Number	WA-39-1030 Old, EB21AR New

## BACKGROUND INFORMATION

### DESCRIPTION OF THE FACILITY

The City of Cle Elum completed major construction of a new Sequential Batch Reactor (SBR) wastewater treatment plant in the spring of 2005 within part of the existing facultative lagoon #1. An SBR is a biological treatment system in which all the major steps, flow equalization, aeration and clarification occurs in the same tank in sequential order. The facility will provide wastewater treatment for the City of Cle Elum, Town of South Cle Elum, City of Roslyn, Ronald and unincorporated areas in the vicinity of Ronald and the Suncadia Resort. Therefore, the facility is designated the Upper Kittitas County Regional Wastewater Treatment Facility. The facility will provide service to the communities and populations discussed in the following paragraphs.

### Communities Serviced or Planned to be Serviced by the Regional Facility

The City of Cle Elum's population is approximately 1,755. Presently the sewer system has 619 residential accounts plus 154 commercial accounts. A number of residential accounts are not currently served by the sewer. An estimated 110 homes are presently vacant out of a total of about 905 units.

The Cle Elum "Bullfrog" Urban Growth Area (UGA) Draft Subarea Plan proposes a variety of residential, commercial, public and recreational uses that would be integrated with the existing City. The Suncadia Master Site Plan Application submitted by Trendwest Inc. proposes

development of 1,100 acres of the UGA including 1,334 single and multifamily units, a 950,000 square foot Business Park, a Community Recreation Center, a neighborhood lake and clubhouse, expansion areas for the School District and cemetery, and a site for the City's Water Treatment Plant. A 100 unit residential capacity is projected for approximately 65 acres of the UGA north of SR 903. Twenty-three acres of a 50-acre property located adjacent to the Cle Elum River floodplain is zoned suburban 1 (one-acre lots). Total residential units within the Cle Elum UGA are projected at 1,457.

The Town of South Cle Elum's population is approximately 543. There are 265 sewer customers. About 240 homes exist within the Town of which about 30 as of 2002 were vacant.

The City of Roslyn's population is approximately 1,017. Sewer customers total about 670, including a mix of residential and commercial accounts. The City has about 615 housing units that, as of 2002, 50 were vacant. The commercial areas of Roslyn include an array of inns, small stores, retail shops and food and beverage establishments totaling about 45 sewer connections. The City plans to connect to the Regional Treatment Plant by the fall of 2006.

The unincorporated community of Ronald lies about one mile northwest of Roslyn along SR-903. This residential community includes two commercial establishments on the sewer system. The sewer system serves a total of 109 customers within an area of about 44 acres.

Pineloch Sun III is a residential development in Kittitas County located within the Ronald Urban Growth Node. As platted, Pineloch Sun III contains 135 lots, approximately 65 which are developed. The lots in Pineloch Sun III are served by septic systems, although soil conditions within the development allow waste migrating to the surface during winter snow melt. Because of health concerns the Kittitas County Health Department has placed a development moratorium on Pineloch Sun III. The regional facility contains sufficient capacity to service Pineloch Sun III. Major interceptor improvements are needed before this community could connect to the Regional Treatment Plant.

The Suncadia Master Planned Resort (MPR) is a proposed four-season, destination resort on 6,225 acres in unincorporated Upper Kittitas County. The project site is in the eastern foothills of the Cascade Mountain range north of Interstate 90 between Cle Elum and Roslyn. Consistent with legislation for MPRs, Suncadia is focused on short-term visitor accommodations (over 70 percent) and destination facilities. Planned residential units total 3,785 and include timeshare and individually owned condominiums, clustered chalet home sites, and larger vacation lots. Resort facilities include, in part, two championship golf courses, equestrian facilities, a comprehensive trail system, and Resort Center.

## **History**

The City constructed its original Publicly Owned Treatment Works (POTW) in 1948 as a single-cell stabilization pond, primary treatment facility. The POTW was upgraded in 1980 with the replacement of the single-cell pond with three bentonite-lined facultative stabilization ponds. Sewerage was treated in the three-cell lagoon system before discharge to the Yakima River. This upgrade also included a new outfall and an extensive sanitary sewer rehabilitation program.

In February 1995, the Cle Elum wastewater treatment lagoons began functioning as a regional system. The lagoon system has had a history of violating NPDES Permit requirements. Interim improvements to the City's lagoon system were completed in 2001. They improved the compliance record through the current permit's upgrade construction interim limits, although at times the loading exceeded the design criteria.

In order to improve and expand the existing wastewater treatment facility to meet future needs, the City decided to implement the improvements using a development agreement with Trendwest (formerly Mountainstar) that obligates Trendwest to fund or provide the facilities. The development agreement includes provisions whereby Trendwest is reimbursed over time for financing the facilities.

On May 20, 2002 the Department received a Draft Cle Elum Regional Sewerage Facilities Plan prepared by Earth Tech of Bellevue, Washington. The Facility Plan along with addenda received April 2003 was approved as a facilities plan in May of 2003. In October 2003 the City submitted Amendment #1 to the Facilities Plan that lists new design criteria. The new upgraded facility has been in operation since the spring of 2005.

## **Collection System Status**

The wastewater collection system for the City of Cle Elum and Town of South Cle Elum totals about 13 miles of pipe serving an area of approximately 7.4 square miles. The City's collection system dates from 1915 with a mix of vitrified clay, concrete and polyvinyl chloride (PVC) pipe in sizes up to 15-inch diameter. Several improvement programs have been undertaken over the years to rehabilitate known defects to the collection system. In 1993, the City replaced 7,514 feet of sewer main, including 26 manholes, plus replacement of an additional 33 manholes and retrofitting of 21 more. In 1996 the City replaced 8,151 feet of sewer main, retrofitted an additional 1,756 feet and replaced an additional 21 manholes. These projects were reported in the 2003 wastewater collection system infiltration and inflow (I&I) report.

Historically, I&I has been a significant problem for the City of Roslyn. From 1973 to the present time, there have been four major collection system improvement projects (1973, 1985, 1989 & 2004), that have attempted to remove excessive inflow and infiltration (I&I). A sewer system evaluation survey done in 1981 indicated the average annual infiltration into the system was approximately 1.5 million gallons per day, (MGD). Average inflow was identified as approximately 0.3 MGD, with peaks up to 2.5 MGD during snow melt.

A 1981 survey prompted the City of Roslyn to replace the majority of the combined clay sewer drain lines with PVC lines in an attempt to address the I&I problem. This was completed during the 1984 – 1985 improvements. The wastewater flows indicate a continuing problem with significant infiltration and inflow into the collection system. According to *Comprehensive Sewer and Wastewater Facility Plan Draft*, Gray & Osborne, Inc., July 2000, average I&I had increased since the sewer line replacement was completed in 1985. In 2004 the City completed a sewer system I&I removal project that replaced sanitary sewers and removed storm drains that were identified in the June, 2003 Storm & Sanitary Sewer Comprehensive Inflow & Infiltration Report as major sources of I&I. Based on the reduced flows seen at the treatment plant in winter and spring of 2004-2005, it is evident that Roslyn removed a major source of I&I. Roslyn will focus its budget at this time towards construction of the interceptor line (fall 2006 completion date) that will connect Roslyn with the Regional Treatment Works, construction of its I&I attenuation facility and decommissioning the 2 five acre 1973 lagoons and disposal of the biosolids. The interceptor will be constructed from the Second Street Interceptor at Stafford Street to the vicinity of the existing Roslyn lagoons. The interceptor could also serve the Cle Elum-Roslyn School District Campus in the event a connection is ever planned. Roslyn plans to continue the removal of combined basement drains when the budget and opportunity allows.

Conceptual plans for the sewage collection systems within Suncadia MPR and the Cle Elum Bullfrog UGA show two systems, with at least 15-inch pipes from each, merging at Ranger Station Road just west of the cemetery. The UGA/MPR interceptor would start there and extend northeast in the Ranger Station Road right-of-way to SR-903, and then east to the old railroad right-of-way where it becomes Second Street. The regional interceptor will begin where the MPR joins the UGA pipe.

### **Treatment Processes**

Wastewater enters the facility at the influent pump station. The influent is then screened prior to entering the headworks where the influent is split between two sequential batch reactors (SBRs). The treated wastewater then flows to an equalization basin located between the two SBRs where it is pumped through the ultra-violet disinfection station; the flow is metered and discharged to the Yakima River at the newly constructed rock drop outfall.



## **Discharge Outfall**

The new facility began operation and use of the new outfall on May 16, 2005.

The City of Cle Elum and the Yakima Nation are partners in a fish habitat improvement project that includes a new wastewater treatment plant outfall, habitat improvements at Hanson Ponds; #1 and #2, and installation of stabilization structures along this particular reach of the Yakima River and I-90.

The outfall alignment crosses beneath Interstate 90 (I-90) near the northeast corner Hanson Pond #2, and parallel to the pond between I-90 and the Yakima River. The City began discharging secondary treated and disinfected effluent from the newly constructed outfall into the Yakima River on May 16, 2005. The new outfall consists of a 20" pipe leading from the effluent pumping station to the west end of Hansen Pond #2. The 20" pipe is buried beneath the main rock drop for protection near the outfall. At the end of the 20" inch pipe a reducer from 20" to 16" points upward at an 11° angle into the plunge pool behind the rock drop.

The rock drop is essentially a weir built across the river with a 42 foot wide boat notch that allows passage of boats and which also provides a predicted low flow depth of 1.5 feet. River water passing through the boat notch will then flow into a plunge pool where the buried 24" outfall pipe section discharges. The rock drop has the advantage of always providing sufficient flow and water depth where mixing is very rapid.

The rock drop was constructed in the main stem of the Yakima River. It is approximately 358 feet long, comprised of five components; North Key, North-Flank, mid-channel Boat Notch, South Flank and south Key. Constructed of basalt rock averaging 3 feet in diameter, the Main Rock Drop required about 1875 cubic yards of rock.

## **Residual Solids**

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit and screenings), in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. Grit, rags, scum and screenings are drained and disposed of as solid waste at the local landfill.

The plant will store the sludge in the existing double lined Lagoon #2. In the lagoon, sludge will be treated facultatively; partial mix aeration will be provided to maintain an oxygenated top layer to prevent odor from releasing into atmosphere. Periodically, perhaps every five years,

accumulated biosolids will be dewatered with a mobile dewatering device and hauled away by truck to an approved contract disposal site. The biosolids removed from the lagoon are expected to meet EPA Class B pathogen requirements.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under Chapter 173-308 WAC, "Biosolids Management". The disposal of other solid waste is under the jurisdiction of the Yakima County Health Department.

## **PERMIT STATUS**

The previous permit for this facility was issued on August 17, 2001 and it became effective on October 1, 2001. The previous permit placed effluent limitations on 5-day Biochemical Oxygen Demand (BOD<sub>5</sub>), Total Suspended Solids (TSS), pH, Fecal Coliform bacteria, Residual Chlorine and Ammonia.

An application for permit renewal was submitted to the Department on September 30, 2005 and accepted by the Department on October 4, 2005.

## **SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT**

The facility received its last compliance inspection without sampling on July 13, 2005.

During the history of the previous permit, the Permittee has remained in compliance, based on Discharge Monitoring Reports (DMRs) submitted to the Department and inspections conducted by the Department.

One spill incident, of an estimated few thousand gallons, occurred on February 2, 2004. Notice of Violation # WQCR-1048 was issued by the Department on March 22, 2004. Two other small spill incidents occurred on July 28, 2004 which were contained within the wastewater facility grounds. No further action was taken by the Department. In all incidents the Permittee responded orderly to mitigate the impact. These incidents while unfortunate, are not uncommon in situations where construction activities are occurring and a plant is in start-up mode.

## **WASTEWATER CHARACTERIZATION**

### **Influent**

Combined influent loadings for Cle Elum and South Cle Elum are contained in Table 1.

**Table 1: Recent Combined Influent Wastewater Loadings for Cle Elum and S. Cle Elum Compared to the Previous 1999-2000 Loadings**

Cle Elum/South Cle Elum			
Parameter	Previous Average Monthly 1999-2000	Average Monthly <sup>1</sup> 2002-2005	Maximum Daily <sup>2</sup> 2002-2005
Flow MGD	0.606	0.5	0.8
BOD lbs/Day	891	772	1313
TSS lbs/Day	765	786	1408

<sup>1</sup>“Average Monthly” the monthly average are based on the arithmetic mean of the samples taken.

<sup>2</sup>“Maximum Daily” means the highest daily discharge of a pollutant measured during a calendar month.

Table 2 contains estimated loadings as a percent of the design criteria for the Cle Elum regional facility. Roslyn is expected to connect to the Regional Facility in the fall of 2006.

**Table 2: Recent Influent Wastewater Loadings for Roslyn Compared to the Previous 1999-2000 Loadings**

Roslyn			
Parameter	Previous Average Monthly 1999-2000	Average Monthly <sup>2</sup> 2002-2005	Maximum Daily <sup>3</sup> 2002-2005
Flow MGD	0.27	0.18	0.34
BOD lbs/Day	289 <sup>4</sup>	173	198
TSS lbs/Day	395 <sup>5</sup>	186	228

<sup>1</sup> Design Criteria: Maximum Month Flow 3.6 MGD, 4850 BOD lbs/Day, 3,750 lbs TSS/day

<sup>2</sup> “Average Monthly” means the monthly average based on the arithmetic mean of the samples taken.

<sup>3</sup> “Maximum Daily” means the highest daily discharge of a pollutant measured during a calendar month.

<sup>4</sup> 289 lbs BOD day is the product of 1999-2000 average month concentration of 108.5 mg/L times the average flow of 0.32 MGD times 8.34 (constant).

<sup>5</sup> 395lbs TSS/day is the product of 1999-2000 average month concentration of 148.1 mg/L times the average flow of 0.32 MGD times 8.34 (constant).

**Table 3: Combined Recent Influent Wastewater Loadings for Roslyn, Cle Elum and S. Cle Elum Compared to the Design Criteria**

Roslyn and Cle Elum/South Cle Elum Combined			
Parameter	Average Monthly 2002-2005	Maximum Daily 2002-2005	Estimated Average Month As Percent of Design Criteria <sup>1</sup>
Flow MGD	0.68	1.14	18.9
BOD lbs/Day	945	1511	19.5
TSS lbs/Day	972	1636	25.9

<sup>1</sup> Design Criteria: Maximum Month Flow 3.6 MGD, 4850 BOD lbs/Day, 3,750 lbs TSS/day.

## Effluent

The upgraded Sequential Batch Reactor (SBR) facility has been discharging to the river since July of 2005. This fact sheet does not characterize the facility's effluent because the treatment process and performance standards of the upgraded facility are not comparable to that of the old facility and three months of data is too limited. However, the performance of the upgraded facility is expected to be greatly improved. For example, the average ammonia concentration in the lagoon effluent for the past three summers (2002-2004) is 10.2 mg/L while the 2005 summer SBR effluent ammonia concentration was 0.2 mg/L. Likewise, TSS and BOD summer performance for the SBR in comparison to past lagoon summer performance improved by 60 to 80 percent.

## SEPA COMPLIANCE

The Draft and Final Environmental Impact Statement (EIS) together constitute the SEPA decision document for the Upper Kittitas County Regional Wastewater Treatment Facility Plan and Yakima River Restoration Projects. Copies of these documents were distributed to the agencies receiving the application (Draft EIS: July 2002; Final EIS: October 2003).

## PROPOSED PERMIT LIMITATIONS

Federal and State regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal

discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (40 CFR 131.36.) The most stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the State of Washington were determined and included in this permit. Ecology does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation. Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department of Ecology. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

## DESIGN CRITERIA

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The design criteria for this treatment facility are taken from Regional Facilities Plan Amendment #1; October, 2003, engineering drawing 000-03 prepared by US Filter is as follows:

**Table 4: Design Standards for Upper Kittitas County Regional Wastewater Treatment Facility**

Parameter	Design Quantity
Monthly average flow (max. month)	3.6 MGD
Instantaneous peak flow	10.5 MGD
BOD <sub>5</sub> influent loading	4,850 lb./day
TSS influent loading	3,750 lb./day

## TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by federal and state regulations. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known available and reasonable methods of prevention, control, and treatment for municipal wastewater.

The following technology-based limits for pH, fecal coliform, BOD<sub>5</sub>, and TSS as found in Chapter 173-221 WAC are:

**Table 5: Technology-based Limits**

Parameter	Limit
pH:	shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
BOD <sub>5</sub> (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
Total Residual Chlorine	Maximum Daily Limit = 0.5 mg/L

The following technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

Monthly effluent BOD mass loadings (lbs/day) were calculated as the average monthly design flow (1.14 MGD) x Concentration limit (30 mg/L) x 8.34 (conversion factor) = mass limit 285.2 BOD lbs/day.

The weekly average effluent BOD mass loading is calculated as  $1.5 \times \text{monthly loading} = 472.8$  lbs/day.

Monthly effluent TSS mass loadings (lbs/day) were calculated as the maximum monthly design flow (1.14 MGD)  $\times$  Concentration limit (30 mg/L)  $\times$  8.34 (conversion factor) = mass limit 285.2 TSS lbs/day.

The weekly average effluent TSS mass loading is calculated as  $1.5 \times \text{monthly loading} = 427.8$  lbs/day.

## **SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS**

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

### **Numerical Criteria for the Protection of Aquatic Life**

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

### **Numerical Criteria for the Protection of Human Health**

The state was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

### **Narrative Criteria**

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

### **Antidegradation**

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when receiving waters are of higher quality than the criteria assigned, the existing water quality shall be protected. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed permit. The discharges authorized by this proposed permit should not cause a loss of beneficial uses.

### **Critical Conditions**

Surface water quality-based limits are derived for the water body's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

### **Mixing Zones**

This permit authorizes an acute and a chronic mixing zone around the point of discharge as allowed by Chapter 173-201A WAC, *Water Quality Standards for Surface Waters of the State of Washington*. This plant has a 30 year build out design criteria and is in its first year of operation. Presently the discharge represents a fraction of the build out design criteria therefore the mixing zone and accompanying dilution factors will be reevaluated to incorporate the effects of growth



at the end of each permit cycle. The Water Quality Standards stipulate some criteria be met before a mixing zone is allowed. The requirements and Ecology's actions are summarized as follows:

**1. The allowable size and location be established in a permit.**

This permit specifies the size and location of the allowed mixing zone.

For this discharge, the percent volume restrictions of the Water Quality Standards resulted in a higher dilution factor than the distance and width restrictions. Therefore, the dilution factor modeled at a managed low flow and within set boundaries was used to determine reasonable potential to exceed water quality standards.

**2. Fully apply "all known available and reasonable methods of treatment" (AKART).**

The technology-based limitations determined to be AKART are discussed in an earlier Section of this fact sheet (pg.14).

**3. Consider critical discharge condition.**

The critical discharge condition is often pollutant-specific or water body-specific and is discussed above under Critical Conditions.

**4. Supporting information clearly indicates the mixing zone would not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses, result in damage to the ecosystem or adversely affect public health.**

The Department of Ecology has reviewed the information on the characteristics of the discharge, receiving water characteristics and the discharge location. Based on this information, Ecology believes this discharge does not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with existing or characteristics uses, result in damage to the ecosystem or adversely affect public health.

**5. Water quality criteria shall not be violated (exceeded) outside the boundary of a mixing zone.**

A reasonable potential analysis, using procedures established by USEPA and the Department of Ecology, was conducted for each pollutant to assure there will be no violations of the water quality criteria outside the boundary of a mixing zone.

**6. The size of the mixing zone and the concentrations of the pollutants shall be minimized.**

The size of the mixing zone (in the form of the dilution factor) has been minimized by the use of design criteria with low probability of occurrence. For example, the reasonable potential analysis used the expected 95<sup>th</sup> percentile pollutant concentration, the 90<sup>th</sup> percentile background concentration, the centerline dilution factor and the low flow occurring once in every 10 years. The concentrations of the pollutants in the mixing zone have been minimized by requiring pollution prevention measures where applicable.

**7. Maximum size of mixing zone**

The authorized mixing zone does not exceed the maximum size restriction.

**8. Acute Mixing Zone**

**A. Acute criteria met as near to the point of discharge as practicably attainable**

The acute criteria have been determined to be met at 10% of the distance of the chronic mixing zone. The acute mixing zone will extend 30 ft downstream of the outfall and extend 10 feet upstream of the outfall.

**B. The concentration of, and duration and frequency of exposure to the discharge, will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.**

The toxicity of pollutants is dependent upon the exposure, which in turn is dependent upon the concentration and the time the organism is exposed to that concentration. For example EPA gives the acute criteria for copper as “freshwater aquatic organisms and their uses should not be affected unacceptably if the 1- hour average concentration (in µg/l) does not exceed the numerical value given by  $(0.960)(e^{(0.9422[\ln(\text{hardness})] - 1.464)})$  more than once every three years on the average.” The limited acute mixing zone authorized for this discharge will assure that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water assuring that it will not cause translocation of indigenous organism near the point of discharge.

### **C. Comply with size restrictions**

The mixing zone authorized for this discharge meets the size restrictions of WAC 173-201A.

### **9. Overlap of Mixing Zones**

This mixing zone does not overlap another mixing zone.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

### **Description of the Receiving Water**

The facility discharges to the Yakima River, which is designated as a Class A receiving water in the vicinity of the outfall. The Cle Elum reach of the river, although Class A, has a maximum temperature criterion of 21° C. Significant nearby non-point sources of pollutants include runoff from agricultural and forestry activities and infiltration from septic tank drainfields.

Characteristic uses include the following:

water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

According to the 1998 303(d) list, this segment of the Yakima River is designated as water quality-impaired for the following parameters: 4,4'-DDE, DDT, cadmium, copper, and mercury. Listings were based on sampling conducted by the U. S. Geological Survey (USGS) between 1987 and 1990 for the National Water Quality Assessment Program (NAWQA).

The Department of Ecology's Environmental Assessment Program (EAP) reviewed the draft 303(d) list and questioned the accuracy of the USGS metals data for the Yakima. Metals data generated by the USGS as part of a similar river monitoring program during this period were known to be subject to contamination. Although collected under different protocols, results from the NAWQA study in the Upper Yakima were inconsistent with metals concentrations the Department had measured near the mouth of the river.

In response to the inconsistencies, the Department's Central Regional Office requested that EAP conduct additional monitoring to verify the 303(d) metals listings for the Upper Yakima River. Sampling was completed in January 2000 and the final report issued in June 2000. The report,

*Concentrations of 303(d) Listed Metals in the Upper Yakima River*, Ecology Pub. No. 00-03-024, concluded that "all samples analyzed were well within State [water quality] standards for aquatic toxicity." The report recommended that "the upper Yakima River be removed from the 303(d) list for historically reported metals violations in the water column" (p. iii). The Department's study did not address the pesticide listings.

### Surface Water Quality Criteria

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

**Table 6: Surface Water Quality Criteria**

Fecal Coliforms	100 organisms/100 mL maximum geometric mean
Dissolved Oxygen	8 mg/L minimum
Temperature	21 degrees Celsius maximum or incremental increases above background
pH	6.5 to 8.5 standard units
Turbidity	less than 5 NTUs above background
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics of concern for this discharge)

### Consideration of Surface Water Quality-Based Limits for Numeric Criteria

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and are defined as follows:

The length of the chronic mixing zone shall extend downstream no greater than **300 feet** and upstream no greater than **100 feet**. The chronic mixing zone width shall be no more than **70 feet**. The aquatic life-based dilution factors for the chronic and acute mixing zones were determined to be **36.8:1** and **7.3:1**, respectively.

The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical condition by the use of Cormix-GI 4.3 and a simple mass balance spreadsheet. The Cormix 3.4 model was the more restrictive for the chronic mixing zone.

Roslyn is expected to connect with the Regional Wastewater Treatment Facility in the fall of 2006. An estimated combined flow of 1.14 MGD was assumed based on the maximum day flow reported by Roslyn and the Cle Elum three year average flow. The dilution factors were derived using the estimated flows instead of the design criteria. They are reflective of “real time” circumstances. For instance, if unexpected spikes in pollutant loading, due to the Roslyn connection, are temporarily experienced “real time” based dilution factors would not necessarily cause a water quality standard violation, where a 30 year “build out” dilution factor set might. At this stage in the development of the Permittee’s facility and service area, the writer believes “build out” based dilution factors are unnecessarily restrictive. As the facility expands its service to the “build-out” design capacity the mixing zone boundaries and dilution factors will be reassigned to reflect estimated discharge rates at the end of each successive permit cycle. The “real time” dilution factors have been determined to be (from Appendix C):

Aquatic Life	Acute	Chronic
	7.3	36.8

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

The critical condition for the Yakima River in the vicinity of the Regional Wastewater Facility consists of a regulated flow regime of 300 CFS. Table 7 contains the data used in calculation of mixing zone and limitations.

**Table 7: Critical Condition Parameters Used in Mixing Zone Analysis**

Data obtained from the Regional Facilities Plan September 2002	
Parameter	Value used

Managed flow	300 cfs
Velocity	6.6 ft/sec
Depth	1.3 feet
Width	35 feet
Roughness (Manning)	n=0.02
Slope	1 default to Manning roughness

**Data obtained from Department of Ecology's EAP Stream Monitoring Website**

Temperature	16.1°C Average 10 year summer high temperatures
pH (high)	8.2 Average 10 year summer highs
Dissolved Oxygen	8.1 mg/L Average 10 year summer lows
Total Ammonia-N	2.0 µg/L All seasons average present to 1971 1.0 µg/L 10 year critical season average
Fecal Coliform	36.4/100 mL dry weather average 10 year summer highs
Conductivity	59.8 (umhos/cm) All season average present to 1971
Turbidity	2.8 NTU All season average present to 1971

BOD<sub>5</sub>--This discharge with technology-based limitations results in a small amount of BOD loading relative to the large amount of dilution occurring in the receiving water at critical conditions. Technology-based limitations will be protective of dissolved oxygen criteria in the receiving water.

Temperature- The receiving water temperature at the critical condition is 16.1°C and the effluent temperature is unknown at this time. The proposed permit cycle will be used to collect temperature data on the effluent and therefore no temperature limit will be established during the proposed permit cycle. In addition, allowing for a higher than expected effluent temperature, the following calculations demonstrate the potential for the effluent to exceed the temperature standard is unexpected.

The predicted temperature using 25% of the regulated Yakima River flow of 300 CFS with an ambient temperature of 16.1°C, and a effluent flow of 1.53 CFS at a temperature of 27.1°C is 16.399°C. The incremental rise is 0.299°C. This temperature rise would not pose a problem for the Permittee even if Class A criteria is used for this reach of the river when ambient water temperature is below the temperature criteria using the following formula:

$$\begin{aligned}\Delta T &= 28^{\circ}\text{C} / (16.1^{\circ}\text{C}_{\text{ambient}} + 7^{\circ}\text{C}) \\ \text{Allowed } \Delta T &= 1.21^{\circ}\text{C} \\ 0.299^{\circ}\text{C} &< 1.21^{\circ}\text{C}\end{aligned}$$

The special temperature criteria for Yakima River from the mouth to the Cle Elum River is 21°C and when ambient temperatures are below 21°C no temperature increase resulting in the following formula is allowed

$$\Delta T = 34^{\circ}\text{C} / (16.1^{\circ}\text{C}_{\text{ambient}} + 9^{\circ}\text{C})$$
$$\text{Allowed } \Delta T = 1.36^{\circ}\text{C}$$
$$0.299^{\circ}\text{C} < 1.36^{\circ}\text{C}$$

When ambient temperatures exceed the criteria no rise caused by human activity above 0.3°C is permitted. One scenario, given the ever tightening temperature restrictions driven by the environmental needs of native anadromous fish species, (Appendix C) poses a new temperature standard of 16°C. The Department's spreadsheet for Calculating Limits that Meet State Temperature Criteria and Implementation Policies derived an effluent limit of 21.38°C when the ambient water temperature is 17° and the effluent flow is a 5.57CFS (3.6MGD). This flow represents the "build-out" flow. Under these conditions using the mass balance equation with a dilution factor of 14.6:1, the resultant temperature is 17.299°C just below the allowable limit of a 0.3°C increase.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

### **Ammonia Considerations**

The following toxic is determined to be present in the discharge: ammonia. A reasonable potential analysis (See Appendix C) was conducted on this parameter to determine whether or not effluent limitations would be required in this permit.

A determination of the reasonable potential for ammonia to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 (Appendix C) at the critical condition. The critical condition in this case occurs July-September. The maximum concentration of ammonia from this system used in the Reasonable Potential came from the maximum day in July 2005 at 28 µg/L of ammonia. The parameters used in the critical condition modeling are as follows: acute dilution factor **7.3**, chronic dilution factor **36.7**, receiving water temperature 16.1 °C with an ambient ammonia concentration of 2 µg/L. No reasonable potential for ammonia to exceed the water quality criteria was found; therefore the permit will not establish a limit for ammonia.

## Chlorine Considerations

Discharges from wastewater treatment plants that use chlorine for coliform control are likely to have a reasonable potential for chlorine toxicity, unless, dechlorination or other chlorine control methods are practiced at the plant and there is adequate dilution of the effluent by the receiving water.

A determination of the reasonable potential for chlorine to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 (Appendix C) at the critical condition. The critical condition in this case occurs July-September. The maximum chlorine concentration used in the analysis was 300 µg/L. The new SBR facility came on line in May of 2005. The parameters used in the critical condition modeling are as follows: acute dilution factor **7.3**, chronic dilution factor **36.7**, receiving water temperature 16.1 °C. Reasonable Potential for chlorine to exceed the water quality criteria was found; therefore the permit will establish a limit for chlorine.

The City expects to utilize the chlorine disinfection system on a standby basis only, such as if the UV system fails. The Department anticipates such occasions will occur rarely, if ever. The previous permit established a final water quality-based effluent limit of 0.139 mg/L; however, complying with this limit would require installation of a dechlorination system, which would be rarely, if ever, used. With this context in mind, this permit requires compliance with the technology-based limit of 0.5 mg/L during the rare occasions when utilizing chlorine disinfection is necessary. During those occasions when utilization of chlorine disinfection is necessary, the Permittee is required to conduct effluent monitoring for chlorine residual to verify compliance. Because the chlorine contact chamber now serves as part of the UV disinfection system, sampling for residual chlorine must occur at the discharge point to the river.

## Whole Effluent Toxicity

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing.

Toxicity caused by unidentified pollutants is not expected in the effluent from this discharge as determined by the screening criteria given in Chapter 173-205 WAC. Therefore, no whole



effluent toxicity testing is required in this permit. The Department may require effluent toxicity testing in the future if it receives information that toxicity may be present in this effluent.

### **Human Health**

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the applicant's discharge is unlikely to contain chemicals regulated for human health.

### **Sediment Quality**

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has been unable to determine at this time the potential for this discharge to cause a violation of sediment quality standards. If the Department determines in the future that there is a potential for violation of the Sediment Quality Standards, an order will be issued to require the Permittee to demonstrate that either the point of discharge is not an area of deposition or, if the point of discharge is a depositional area, that there is not an accumulation of toxics in the sediments.

### **GROUND WATER QUALITY LIMITATIONS**

This Permittee has no discharge to ground and therefore no limitations are required based on potential effects to ground water.

### **COMPARISON OF EFFLUENT LIMITS WITH THE EXISTING PERMIT, REVISED JULY 1, 2003**

Parameter	Existing Limits <sup>1</sup>		Proposed Limits <sup>2</sup>	
	Average Monthly	Average Weekly	Average Monthly	Average Weekly
<b>5-Day Biochemical Oxygen</b>	30 mg/L, 363 lbs/day and 85% minimum	45 mg/L, 545 lbs/day	30 mg/L, 285.2 lbs/day and 85% minimum	45 mg/L, 427.8 lbs/day

Demand (BOD <sub>5</sub> )	removal		removal	
<b>Total Suspended Solids (TSS)</b>	30 mg/L, 363 lbs/day and 85% minimum removal	45 mg/L, 545 lbs/day	30 mg/L, 285.2 lbs/day and 85% minimum removal	45 mg/L, 427.8 lbs/day
<b>Fecal Coliform Bacteria</b>	200/100 mL	400/100 mL	200/100 mL	400/100 mL
<b>pH</b>	shall not be outside the range of 6.0 to 9.0		shall not be outside the range of 6.0 to 9.0	
<b>Total Residual Chlorine</b>	0.5 mg/L		0.5 mg/L	
<b>Ammonia</b>	19.0 mg/L		Not Required	

<sup>1</sup> Based on the Design Criteria of 1.45 MGD.

<sup>2</sup> Based on the estimated combined flows of Roslyn and Cle Elum at 1.14 MGD

The rationale for using a flow of 1.14 MGD for dilution factor determination was discussed earlier on page 21. The limits therefore, are based on the same flow estimation used for determining the dilution factors.

## MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

Monitoring for Flow, Temperature, pH, BOD, TSS, Fecal Coliform Bacteria, Ammonia Nitrogen, Total Kjeldahl Nitrogen, Dissolved Oxygen, Oil and Grease, Total Phosphorus and Total Hardness is being required to further characterize the effluent. In addition, the Permittee is required to conduct an EPA Priority Pollutant scan for metals twice during the permit cycle. These pollutants could have a significant impact on the quality of the surface water.

Although a facility is required to monitor BOD and TSS three times per week with design criteria over 1 MGD, it is expected to be some time before that level of discharge is reached. The design of the plant is based on a 30 year build out. The current combined average monthly flows of Roslyn and Cle Elum is 0.62 MGD, therefore the Permittee will be required to monitor BOD and TSS twice weekly until the discharge is equal to or greater than 1 MGD for three consecutive months. Then the Permittee will be required to sample three times per week. The dilution factors and limits were based on a 1.14 MGD estimated flow, which in the writer's judgment is conservative. If the area was to experience a growth rate of 10 % for the next 5 years and the flow tracked at the same rate the flow would still be below the 1 MGD mark at the end of

the proposed permit term for this reason the writer believes the proposed monitoring requirements are appropriate..

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Sludge monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (July 1994) for a POTW.

#### **LAB ACCREDITATION**

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. The laboratory at this facility is accredited for General Chemistry and Microbiology.

### **OTHER PERMIT CONDITIONS**

#### **REPORTING AND RECORDKEEPING**

The conditions of S3. are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

#### **PREVENTION OF FACILITY OVERLOADING**

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in proposed permit requirement S.4. to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4. restricts the amount of flow.

## **OPERATION AND MAINTENANCE (O&M)**

The proposed permit contains condition S.5. as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

## **RESIDUAL SOLIDS HANDLING**

To prevent water quality problems the Permittee is required in permit condition S7. to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and State Water Quality Standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under Chapter 70.95J RCW, Chapter 173-308 WAC "Biosolids Management", and Chapter 173-350 WAC "Solid Waste Handling Standards". The Permittee holds Biosolids Permit number BA-0021938 and may dispose of its biosolids at an approved beneficial-use land disposal site.

## **PRETREATMENT**

An industrial user survey may be required to determine the extent of compliance of all industrial users of the sanitary sewer and wastewater treatment facility with federal pretreatment regulations (40 CFR Part 403 and Sections 307(b) and 308 of the Clean Water Act), with state regulations (Chapter 90.48 RCW and Chapter 173-216 WAC), and with local ordinances.

As sufficient data becomes available, the Permittee shall, in consultation with the Department, reevaluate its local limits in order to prevent pass through or interference. Upon determination by the Department that any pollutant present causes pass through or interference, or exceeds established sludge standards, the Permittee shall establish new local limits or revise existing local limits as required by 40 CFR 403.5. In addition, the Department may require revision or establishment of local limits for any pollutant that causes an exceedance of the Water Quality Standards or established effluent limits, or that causes whole effluent toxicity. The determination by the Department shall be in the form of an Administrative Order. In order to develop these local limits, the Department will provide environmental criteria or limits for the various pollutants of concern.

The Department may modify this permit to incorporate additional requirements relating to the establishment and enforcement of local limits for pollutants of concern. Any permit modification is subject to formal due process procedures pursuant to state and federal law and regulation.

### **Wastewater Permit Required**

RCW 90.48 and WAC 173-216-040 require SIUs to obtain a permit prior to discharge of industrial waste to the Permittee's sewerage system. This provision prohibits the POTW from accepting industrial wastewater from any such dischargers without authorization from the Department.

### **Requirements for Routine Identification and Reporting of Industrial Users**

The NPDES permit requires non-delegated POTWs to "take continuous, routine measures to identify all existing, new, and proposed SIUs and potential significant industrial users (PSIUs) discharging to the Permittee's sewerage system". Examples of such routine measures include regular review of business tax licenses for existing businesses and review of water billing records and existing connection authorization records. System maintenance personnel can also be diligent during performance of their jobs in identifying and reporting as-yet unidentified industrial dischargers. Local newspapers, telephone directories, and word-of-mouth can also be important sources of information regarding new or existing discharges. The POTW is required to notify an industrial discharger, in writing, of their responsibilities regarding application for a State waste discharge permit and to send a copy of the written notification to the Department. The Department will then take steps to solicit a State waste discharge permit application.

### **Duty to Enforce Discharge Prohibitions**

This provision prohibits the POTW from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer. The first portion of the provision prohibits acceptance of pollutants which cause pass through or interference. The definitions of pass through and interference are in Appendix B of the fact sheet.

The second portion of this provision prohibits the POTW from accepting certain specific types of wastes, namely those which are explosive, flammable, excessively acidic, basic, otherwise corrosive, or obstructive to the system. In addition wastes with excessive BOD, petroleum based oils, or which result in toxic gases is prohibited to be discharged. The regulatory basis for these prohibitions is 40 CFR Part 403, with the exception of the pH provisions which are based on WAC 173-216-060.

The third portion of this provision prohibits certain types of discharges unless the POTW receives prior authorization from the Department. The discharges include cooling water in significant volumes, stormwater and other direct inflow sources, and wastewaters significantly affecting system hydraulic loading, which do not require treatment.

### **Support by the Department for Developing Partial Pretreatment Program by POTW**

The Department has committed to providing technical and legal assistance to the Permittee in fulfilling these joint obligations, in particular assistance with developing an adequate sewer use ordinance, notification procedures, enforcement guidelines, and developing local limits and inspection procedures.

### **SPILL PLAN**

The Department has determined that the Permittee stores a quantity of chemicals that have the potential to cause water pollution if accidentally released. The Department has the authority to require the Permittee to develop best management plans to prevent this accidental release under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080.

The proposed permit requires the Permittee to develop and implement a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs.

The Permittee has developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the Permittee to update this plan and submit it to the Department.

### **OUTFALL EVALUATION**

Proposed permit condition S.10. requires the Permittee to conduct an outfall inspection and submit a report detailing the findings of that inspection. The purpose of the inspection is to determine the condition of the discharge pipe and to determine if sediment is accumulating in the vicinity of the outfall.

### **GENERAL CONDITIONS**

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual municipal NPDES permits issued by the Department.

## PERMIT ISSUANCE PROCEDURES

### PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

### RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The Department proposes that this permit be issued for 5 years.

## REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

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1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

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1991. Wastewater Engineering, Treatment, Disposal, and Reuse. Third Edition.

Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

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Permit and Wastewater Related Information  
(<http://www.ecy.wa.gov/programs/wq/wastewater/index.html>)

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1994. Permit Writer's Manual. Publication Number 92-109

Water Pollution Control Federation.

1976. Chlorination of Wastewater.

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(E2). (Cited in EPA 1985 op.cit.)



## APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on date and date in name of publication to inform the public that an application had been submitted and to invite comment on the reissuance (or issuance) of this permit.

The Department will publish a Public Notice of Draft (PNOD) on date, in name of publication to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator  
Department of Ecology  
Central Regional Office  
15 West Yakima Avenue, Suite 200  
Yakima, WA 98902

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the 30 day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least 30 days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within 30 days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the

permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, 509/457-7105, or by writing to the address listed above.

This permit and fact sheet were written by Richard Marcley.

## APPENDIX B--GLOSSARY

**Acute Toxicity**--The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

**AKART**-- An acronym for “all known, available, and reasonable methods of prevention, control, and treatment”.

**Ambient Water Quality**--The existing environmental condition of the water in a receiving water body.

**Ammonia**--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

**Average Monthly Discharge Limitation** --The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

**Average Weekly Discharge Limitation** -- The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

**Best Management Practices (BMPs)**--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

**BOD<sub>5</sub>**--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD<sub>5</sub> is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

**Bypass**--The intentional diversion of waste streams from any portion of a treatment facility.

**CBOD<sub>5</sub>** – The quantity of oxygen utilized by a mixed population of microorganisms acting on the nutrients in the sample in an aerobic oxidation for five days at a controlled temperature of 20 degrees Celsius, with an inhibitory agent added to prevent the oxidation of nitrogen compounds. The method for determining CBOD<sub>5</sub> is given in 40 CFR Part 136.

**Chlorine**--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

**Chronic Toxicity**--The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

**Clean Water Act (CWA)**--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

**Combined Sewer Overflow (CSO)**--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

**Compliance Inspection - Without Sampling**--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

**Compliance Inspection - With Sampling**--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

**Composite Sample**--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

**Construction Activity**--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

**Continuous Monitoring** --Uninterrupted, unless otherwise noted in the permit.

**Critical Condition**--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

**Dilution Factor**--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

**Engineering Report**--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

**Fecal Coliform Bacteria**--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

**Grab Sample**--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

**Industrial User**-- A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

**Industrial Wastewater**--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

**Infiltration and Inflow (I/I)**--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

**Interference** -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal and;

Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

**Major Facility**--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

**Maximum Daily Discharge Limitation**--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

**Method Detection Level (MDL)**--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

**Minor Facility**--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

**Mixing Zone**--A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in State regulations (Chapter 173-201A WAC).

**National Pollutant Discharge Elimination System (NPDES)**--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

**Pass through** -- A discharge which exits the POTW into waters of the-State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

**pH**--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

**Potential Significant Industrial User**--A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

- a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

The Department may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

**Quantitation Level (QL)--** A calculated value five times the MDL (method detection level).

**Significant Industrial User (SIU)--**

- 1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;
- 2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority\* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority\* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

\*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

**State Waters--**Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

**Stormwater--**That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.



**Technology-based Effluent Limit**--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

**Total Suspended Solids (TSS)**--Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

**Upset**--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

**Water Quality-based Effluent Limit**--A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

## **APPENDIX C--TECHNICAL CALCULATIONS**

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at <http://www.ecy.wa.gov/programs/wq/wastewater/index.html>

See next page.

CHRONIC MIXING ZONE DILUTION FACTOR 1.14 MGD:

CORMIX MIXING ZONE EXPERT SYSTEM  
CORMIX-GI Version 4.3GT  
HYDRO1:Version-4.3 April,2004

SITE NAME/LABEL:  
DESIGN CASE: Cle Elum  
FILE NAME: C:\Program Files\CORMIX-GI 4.3\  
Using subsystem CORMIX1: Submerged Single Port Discharge  
Start of session: 11/07/2005--17:00:33

\*\*\*\*\*

SUMMARY OF INPUT DATA:

AMBIENT PARAMETERS:

Cross-section = bounded  
Width BS = 10.67 m  
Channel regularity ICHREG = 1  
Ambient flowrate QA = 2.12 m<sup>3</sup>/s  
Average depth HA = 0.91 m  
Depth at discharge HD = 0.91 m  
Ambient velocity UA = 0.2177 m/s  
Darcy-Weisbach friction factor F = 0.0323  
Calculated from Manning's n = 0.02  
Wind velocity UW = 1 m/s  
Stratification Type STRCND = U  
Surface temperature = 16.10 degC  
Bottom temperature = 16.10 degC  
Calculated FRESH-WATER DENSITY values:  
Surface density RHOAS = 998.9280 kg/m<sup>3</sup>  
Bottom density RHOAB = 998.9280 kg/m<sup>3</sup>

DISCHARGE PARAMETERS:

Submerged Single Port Discharge  
Nearest bank = left  
Distance to bank DISTB = 5.33 m  
Port diameter DO = 0.2286 m  
Port cross-sectional area AO = 0.0410 m<sup>2</sup>  
Discharge velocity UO = 1.06 m/s  
Discharge flowrate QO = 0.043325 m<sup>3</sup>/s  
Discharge port height HO = 0.11 m  
Vertical discharge angle THETA = 0 deg  
Horizontal discharge angle SIGMA = 0 deg  
Discharge temperature (freshwater) = 25 degC  
Corresponding density RHO0 = 997.0456 kg/m<sup>3</sup>  
Density difference DRHO = 1.8825 kg/m<sup>3</sup>  
Buoyant acceleration GPO = 0.0185 m/s<sup>2</sup>  
Discharge concentration CO = 8.1 deg.C  
Surface heat exchange coeff. KS = 0 m/s  
Coefficient of decay KD = 0 /s

\*\*\*\*\* REGULATORY MIXING ZONE SUMMARY \*\*\*\*\*

The plume conditions at the boundary of the specified RMZ are as follows:

Pollutant concentration = 0.220437 deg.C  
Corresponding dilution = 36.8  
Plume location: x = 91.44 m  
(centerline coordinates) y = 5.33 m  
z = 0.91 m  
Plume dimensions: half-width = 10.67 m  
thickness = 0.69 m

**Mass Balance Dilution Factor based on combined flow estimates for the next permit cycle.**

Chronic Dilution Mass Balance Model					
CHRONIC DILUTION					potential
eff. flow cfs	effluent temp	river flow cfs	river temp	<u>final temp</u>	<u>dil factor</u>
1.53	27.1	75	16.1	16.320	50.0

# Acute Mixing Zone Dilution Factor at 1.14 MGD:

```

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
CORMIX MIXING ZONE EXPERT SYSTEM
CORMIX-GI Version 4.3GT
HYDRO1:Version-4.3 April,2004

SITE NAME/LABEL:
DESIGN CASE: Cle Elum
FILE NAME: C:\Program Files\CORMIX-GI 4.3\S:
Using subsystem CORMIX1: Submerged Single Port Discharges
Start of session: 11/07/2005--17:17:20
*****
SUMMARY OF INPUT DATA:
-----
AMBIENT PARAMETERS:
Cross-section = bounded
Width BS = 10.67 m
Channel regularity ICHREG = 1
Ambient flowrate QA = 0.21 m^3/s
Average depth HA = 0.91 m
Depth at discharge HD = 0.91 m
Ambient velocity UA = 0.0218 m/s
Darcy-Weisbach friction factor F = 0.0323
Calculated from Manning's n = 0.02
Wind velocity UW = 1 m/s
Stratification Type STRCND = U
Surface temperature = 16.10 degC
Bottom temperature = 16.10 degC
Calculated FRESH-WATER DENSITY values:
Surface density RHOAS = 998.9280 kg/m^3
Bottom density RHOAB = 998.9280 kg/m^3

DISCHARGE PARAMETERS: Submerged Single Port Discharge
Nearest bank = left
Distance to bank DISTB = 5.33 m
Port diameter DO = 0.2286 m
Port cross-sectional area AO = 0.0410 m^2
Discharge velocity UO = 2.04 m/s
Discharge flowrate QO = 0.083535 m^3/s
Discharge port height HO = 0.11 m
Vertical discharge angle THETA = 0 deg
Horizontal discharge angle SIGMA = 0 deg
Discharge temperature (freshwater) = 25 degC
Corresponding density RHOO = 997.0456 kg/m^3
Density difference DRHO = 1.8825 kg/m^3
Buoyant acceleration GPO = 0.0185 m/s^2
Discharge concentration CO = 8.9 deg.C
Surface heat exchange coeff. KS = 0 m/s
Coefficient of decay KD = 0 /s

***** REGULATORY MIXING ZONE SUMMARY *****
The plume conditions at the boundary of the specified RMZ are as follows:
Pollutant concentration = 1.223351 deg.C
Corresponding dilution = 7.3
Plume location: x = 9.15 m
(centerline coordinates) y = 0 m
z = 0.91 m
Plume dimensions: half-width = 0.91 m
thickness = 0.91 m

```

Acute Dilution Mass Balance Model					
CHRONIC DILUTION					potential
eff. flow	effluent	river flow	river	final conc	dil factor
cfs	mg/L	cfs	mg/L		
1.53	27.1	7.5	16.1	17.964	5.9

Mass Balance Acute Dilution Factor based on combined flow estimates for the next permit cycle.

Calculating Effluent Limits that Meet the State Temperature Criteria and Implementation Policies								
(All values in degrees centigrade)								
Input Values for Calculating Effluent Limits								
Factors affecting effluent Temperature						Enter Values		
Upstream ambient Temperature:						16.1		
Numeric Criteria (12, 16, 18, 20C etc):						21		
System potential temperature (if known):						21		
Dilution Factor:						36.8		
Effluent Limit Necessary to Meet Temperature Standards								
Assigned Criteria for Waterbody								
9C	12C	13C	16C	17.5C	18C	20C	21C	
#####	#####	#####	#####	#####	#####	#####	31.74	
Intermediate Calculations								
	9C	12C	13C	16C	17.5C	18C	20C	21C
Incremental allowance at BG temp.	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	0.3
Effluent limit at the specific BG temp	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	27.14
Effluent limit at higher system potential	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	32.04

Class A waters: when ambient conditions are 21°C or below the allowed temperature increase at the edge of the chronic mixing zone is determined by the following formula;

$$\Delta T = 34^{\circ} \text{C} / (16.1^{\circ} \text{C}_{\text{ambient}} + 9^{\circ} \text{C})$$

$$\text{Allowed } \Delta T = 1.36^{\circ} \text{C}$$

$$0.16^{\circ} \text{C} < 1.36^{\circ} \text{C}$$

or when ambient water are above the criterion no increase above 0.3° C is allowed.

Temperature Mass Balance Model Based on Cormix <sup>1</sup> 3.4						
Chronic Dilution Factor of 36.8						
@ 25% of 300 CSF						
Regulated Flow						
Yakima River						
eff flow cfs	effluent temp	Dilution	valuator	ambient temp	final temp	dil factor
1.53	27.1	54.8		16.1	16.399	36.8
Temperature Increase Limit				Predicted Increase		
When ambient is above criterion 0.3° C						
When ambient is below criterion 1.36° C				0.299 °C		

<sup>1</sup> Modeled on the combined average flow (1MGD) of Roslyn and Cle Elum for past three years (2002-2005).

<sup>1</sup> Assumed temperature limit of 27.1°C based on specific background temperature (BG) of 16.1°C.

Calculations based on an assumed new temperature standard of 16° C with ambient at 17°C.

Calculating Effluent Limits that Meet the State Temperature Criteria and Implementation Policies									
(All values in degrees centigrade)									
Input Values for Calculating Effluent Limits									
<u>Factors affecting effluent Temperature</u>							<u>Enter Values</u>		
Upstream ambient Temperature:							17		
Numeric Criteria (12, 16, 18, 20C etc):							16		
System potential temperature (if known):							17.5		
Dilution Factor:							14.6		
Effluent Limit Necessary to Meet Temperature Standards									
<u>Assigned Criteria for Waterbody</u>									
<u>9C</u>	<u>12C</u>	<u>13C</u>	<u>16C</u>	<u>17.5C</u>	<u>18C</u>	<u>20C</u>	<u>21C</u>		
#####	#####	#####	20.08	#####	#####	#####	#####		
<u>Intermediate Calculations</u>									
<u>9C</u>	<u>12C</u>	<u>13C</u>	<u>16C</u>	<u>17.5C</u>	<u>18C</u>	<u>20C</u>	<u>21C</u>		
Incremental allowance at BG temp.	FALSE	FALSE	FALSE	0.3	FALSE	FALSE	FALSE	FALSE	FALSE
Effluent limit at the specific BG temp	FALSE	FALSE	FALSE	21.38	FALSE	FALSE	FALSE	FALSE	FALSE
Effluent limit at higher svstem potential	FALSE	FALSE	FALSE	21.88	FALSE	FALSE	FALSE	FALSE	FALSE

Temperature Mass Balance Model Based on Maximum Allowed Dilution Factor of 14.6 Based on 3.6 MGD @ 25% of 300 CFS Regulated Flow						
					Yakima River	
eff flow cfs	effluent temp	River flow cfs	ambient temp	final temp	dil factor	
5.5	21.38	75	17	17.299	14.6	
Temperature Increase Limit 0.3 C			Predicted Increase 0.299 °C			

Freshwater un-ionized ammonia criteria based on EPA Gold Book  
(EPA 440/5-86-001).

Based on Lotus File NH3FRESH.WK1 Revised 19-Oct-93

INPUT	
1. Temperature (deg C; 0<T<30):	21.0
2. pH (6.5<pH<9.0):	7.20
3. Total Ammonia (ug N/L):	300.0
4. Acute TCAP (Salmonids present- 20; absent- 25):	20
5. Chronic TCAP (Salmonids present- 15; absent- 20):	15
OUTPUT	
1. Intermediate Calculations:	
Acute FT:	1.00
Chronic FT:	1.41
FPH:	2.07
RATIO:	29
pKa:	9.37
Fraction Of Total Ammonia Present As Un-ionized:	0.6726%
2. Sample Un-ionized Ammonia Concentration (ug/L as NH3-N):	2.0
3. Un-ionized Ammonia Criteria:	
Acute (1-hour) Un-ionized Ammonia Criterion (ug/L as NH3-N):	103.4
Chronic (4-day) Un-ionized Ammonia Criterion (ug/L as NH3-N):	7.7
4. Total Ammonia Criteria:	
Acute Total Ammonia Criterion (ug/L as NH3-N):	15,366
Chronic Total Ammonia Criterion (ug/L as NH3-N):	1,140



**Reasonable Potential for Effluent to exceed the Water Quality Standards.**

REASONABLE POTENTIAL				CALCULATIONS													
<div>This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-</div>				State Water Quality Standard		Max concentration at edge of...		LIMIT REQ'D?	Effluent percentile value	Max effluent conc. measured (metals as total recoverable)	Coeff Variation	s	# of samp	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	
Parameter	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Conc (metals as dissolved)	Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone										
Parameter	Acute	Chronic	ug/L	ug/L	ug/L	ug/L	ug/L		Pn	ug/L	CV		n				
AMMONIA	0.95	0.95	2.0000	1140.00	15366.00	69.63	15.45	NO	0.95	0.741	300.00	0.60	0.55	10	1.74	7.3	36.7
CHLORINE (Total Residual)	7782505			19.00	11.00	155.95	30.94	YES	0.95	0.224	300.00	0.60	0.55	2	3.79	7	37

Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone.									
Permit Limit Calculation Summary									
	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator or	Metal Criteria Translator or	Ambient Concentration	Water Quality Standard Acute	Water Quality Standard Chronic	Average Monthly Limit (AML)	Maximum Daily Limit (MDL)
PARAMETER			Acute	Chronic	ug/L	ug/L	ug/L	ug/L	ug/L
chlorine	7.3	36.80			0.0001	19.0000	11.0000	95.5	139.3

*FACT SHEET FOR  
NPDES PERMIT NO. WA-002193-9*

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*CITY OF CLE ELUM  
UPPER KITTITAS CO. REGIONAL  
WASTEWATER TREATMENT FACILITY  
EXPIRATION DATE:*

## **APPENDIX D - RESPONSE TO COMMENTS**

**DRAFT**